

CLAIMS

1. In a data capture system, a hand-held data terminal of size and weight to be held in one hand during use, said data terminal being of the type comprising:

- (a) a user interface terminal portion having user interface means providing for user interaction with the data terminal in the supervision of data capture operations,
- (b) an automatically operating data transducing means automatically operative to read at least a full line of indicia automatically from an external medium to generate data signals, and to wirelessly transfer data signals between the data terminal and an external host,
- (c) control means operatively interconnected with the user interface means and with the automatically operating data transducing means for controlling data capture operation of the data terminal under user supervision, and
- (d) portable power supply means for powering the data terminal;

said data capture system being particularly characterized in that:

a terminal module or modules contains said automatically operating data transducing means, and consequently contains an automatic full image reader unit operative to read at least one full line of indicia automatically without requiring manual movement of the data terminal, and also contains an automatic wireless communication unit for the wireless transfer of data signals,

said terminal module or modules being readily removable and replaceable with respect to the data terminal.

2. In a data capture system according to claim 1, said hand-held data terminal having a normal user operating orientation during user interaction with said user interface means, with the user interface means generally

facing toward the user, and said hand-held data terminal having a normal reading disposition during automatic reading operation of said automatic full image reader unit which essentially corresponds with said normal user operating orientation so as to accommodate rapid transitions between automatic reading operation and user interaction with the user interface means without requiring radical changes in the manually held disposition of the data terminal.

3. In a data capture system according to claim 1, said hand-held data terminal being formed of terminal modules forming longitudinally extended layers separated at a juncture plane, the user interface means being in a longitudinally extended layer at an upper side of the juncture plane in normal user operating orientation of the user interface means, and the automatic full image reader unit being directed generally forwardly and away from the user in said normal user operating orientation so as to be essentially in a normal reading disposition.

4. In a data capture system according to claim 1, 2 or 3, said user interface means comprising a manually actuatable selection unit extending from a proximal end proximate to the user during user interaction therewith, to a distal end relatively more remote from the user, said data terminal having a hand grip portion substantially underlying the distal end of the manually actuatable selector unit and supporting the manually actuatable selector unit during manual actuation thereof.

5. In a data capture system according to claim 4, said hand grip portion having a rounded grip-conforming configuration so as to be comfortably embraced by the user's hand.

6. In a data capture system according to claim 5, a hand strap spanning longitudinally across the rounded grip-conforming configuration for backing the hand supporting said data terminal.

7. In a data capture system according to claim 4, a modular housing containing said automatically operating data transducing means and providing a downwardly

protruding shoulder at a forward side of the hand grip portion.

8. In a data capture system according to claim 1, 2 or 3, said wireless communication unit being removable and replaceable without requiring tuning adjustments.

9. In a data capture system according to claim 8, said wireless communication unit having a digital interface with the remainder of the data terminal such that said wireless communication unit is removable and replaceable without requiring tuning adjustments.

10. In a data capture system according to claim 1, 2 or 3, said user interface terminal portion forming a hand-held data terminal unit readily separable in its entirety from said automatically operating data transducing means, and being capable of effecting manual data capture operations as a separate hand-held entity.

11. In a data capture system according to claim 1, 2 or 3, a common transducer housing containing said automatic full image reader unit and said automatic wireless communication unit, said common transducer housing being readily detachable from the user interface terminal portion.

12. In a data capture system according to claim 11, said control means comprising decoder means also contained in said common transducer housing for decoding data signals received from the automatic full image reader unit and for supplying decoded data signals to said wireless communication unit for transfer to an external host.

13. In a data capture system according to claim 1, 2 or 3, said control means, and said portable power supply means together with said data transducing means being readily separable from the user interface terminal portion.

14. In a data capture system according to claim 13, a hand-held terminal part containing said control means, said portable power supply means and said data transducing means and being operable entirely separate from said user interface terminal portion for automatic reading of indicia from an external medium and for wireless transfer of data signals to an external host.

15. In a data capture system according to claim 14, said

hand-held terminal part having a hand grip portion for manual support thereof and for use in manually directing the automatic full image reader unit into registry with at least a full line of indicia to be read during data capture operation separate from the user interface terminal portion.

16. In a data capture system according to claim 15, said hand-held terminal part having manually actuated selector means in proximity to the hand grip portion for manual actuation by the hand supporting the hand grip portion so as to control the automatic reading of indicia and the wireless transfer of data signals, while the hand-held terminal part is entirely detached from the user interface terminal portion.

17. In a data capture system according to claim 14, said hand-held terminal part having voice synthesis means for interacting with the user to facilitate user supervision of the operation of said data transducing means.

18. In a data capture system according to claim 14, said hand-held terminal part having voice recognition means for responding to user verbal instructions to facilitate user supervision of the operation of said data transducing means.

19. In a data capture system, a hand-held data terminal of size and weight to be held in one hand during use, said data terminal being of the type comprising

- (a) user interface means providing for user interaction with the data terminal,
- (b) automatically operating data transducing means automatically operative to transduce data signals in the furtherance of automatic data capture operations,
- (c) control means operatively interconnected with the user interface means and with the automatically operating data transducing means for controlling data capture operations of the data terminal, and
- (d) portable power supply means for powering the data terminal;

wherein said data capture system further comprises:

at least three terminal modules forming said hand-held data

terminal, a first terminal module extending longitudinally in a first layer and having a length generally comparable to the overall length of the data terminal, and second and third terminal modules extending longitudinally and having aligned longitudinal axes, said second and third terminal modules lying generally in a second layer adjoining said first terminal module along a juncture plane which is located between said first terminal module, and said second and third terminal modules.

20. In a data capture system according to claim 19, said first terminal module having said automatically operating data transducing means therein and forming a platform for support of the second and third modules along said juncture plane.

21. In a data capture system according to claim 19, said first terminal module having a hand grip portion which when gripped by the user supports the data terminal with the user interface means directed toward the user.

22. In a data capture system according to claim 19, said second terminal module including said user interface means and being capable of operation in conjunction with said user interface means as a manually controlled data terminal unit when entirely separate from said first terminal module.

23. In a data capture system according to claim 19, said second and third terminal modules having said user interface means and having a wireless communication unit as operative parts thereof such that the second and third terminal modules are operative entirely separate from the first terminal module, as a data terminal unit capable of on-line wireless communication with a remote host.

24. In a data capture system according to claim 19, 20, 21, 22 or 23, said third terminal module containing a wireless transceiver unit, and said third terminal module being removable and replaceable as a unit.

25. In a data capture system according to claim 24, said third terminal module being removable and replaceable without requiring any tuning adjustments.

26. In a data capture system according to claim 19, said

first terminal module comprising said user interface means and being removable and replaceable as a unit.

27. In a data capture system according to claim 26, said first terminal module having a substantially greater width than said second and third terminal modules and being replaceable with a first terminal module unit of substantially different configuration to form a data terminal unit with different user interface characteristics.

28. In a data capture system according to claim 27, said second terminal module having a grip-conforming configuration so as to be comfortably gripped by one hand during operation of the data terminal.

29. In a data capture system according to claim 28, said user interface means comprising manually actuated selector means having a greater width than said second terminal module, said second terminal module having a hand strap at the underside thereof longitudinally spanning said grip-conforming configuration such that the user can spread his hand which is backed by the hand strap to support a portion of the manually actuated selector means at a lateral margin thereof not directly supported by the second terminal module.

30. In a data capture system according to claim 19, said first terminal module having display means with manually actuated selector means at a lateral margin thereof laterally offset from an underlying portion of the remaining terminal modules, the remaining terminal modules providing a grip-conforming configuration for receiving the user's hand in supporting relation thereto and having a hand strap longitudinally spanning said grip-conforming configuration such that the user can spread his hand which is backed by the hand strap to support the manually actuated selector means at the lateral margin during manual actuation thereof.

31. In a data capture system according to claim 19, said first terminal module comprising said user interface means, said second and third terminal modules providing a hand-held terminal part underlying said first terminal module in

normal user operating disposition of said first terminal module, said hand-held terminal part having a symmetrical hand grip portion suitable for comfortable gripping by the right or left hand.

32. In a data capture system according to claim 31, said hand-held terminal part having manually actuated selectors at the respective sides thereof suitable for actuation by the hand associated with said hand grip portion.

33. In a data capture system according to claim 32, said hand-held terminal part having a hand strap longitudinally spanning the hand grip portion for stabilizing the support of the hand-held terminal part during selective actuation of the manually actuated selectors.

34. In a data capture system according to claim 19, said first terminal module comprising a keyboard for disposition proximal to the user during use thereof and a display more remote from the user, said second and third terminal modules providing a hand-held terminal part with a hand grip portion underlying said keyboard.

35. In a data capture system according to claim 19, said third terminal module having an automatic reader for automatically reading indicia remote from the user while the data terminal is in an automatic reading orientation, said first terminal module comprising said user interface means and having a normal user operating orientation during user interaction with said user interface means which essentially corresponds with said automatic reading orientation.

36. In a data capture system according to claim 19, said automatically operating transducing means comprising an automatic full image reader extending along the juncture plane and being directed transversely to the longitudinal axes of the terminal modules such that during automatic reading operation the junction plane is disposed generally transversely to the plane of indicia to be read.

37. In a data capture system according to claim 36, said first terminal module comprising a keyboard for disposition proximal to the user during manual operation, a display for disposition remote from the user, and having said automatic

full image reader disposed at a remote margin of the the display remote from the user.

38. In a data capture system, a hand-held data terminal of size and weight to be held in one hand during use, said data terminal being of the type comprising

- (a) user interface means providing for user interaction with the data terminal,
- (b) automatically operating data transducing means automatically operative to transduce data signals in the furtherance of automatic data capture operations,
- (c) control means operatively interconnected with the user interface means and with the automatically operating data transducing means for controlling data capture operations of the data terminal, and
- (d) portable power supply means for powering the data terminal;

wherein said data capture system further comprises:

said user interface means extending longitudinally in a first layer and constructed for modular attachment with the automatically operating data transducing means lying in a second layer on an opposite side of a juncture plane from said user interface means.

39. In a data capture system according to claim 38, said hand-held data terminal having a normal user operating orientation during user interaction with said user interface means, with the user interface means generally facing toward the user, said automatically operating data transducing means comprising an automatic full image reader unit, and said hand-held data terminal having a normal reading disposition during automatic reading operation of said automatic full image reader unit which essentially corresponds with said normal user operating orientation so as to accommodate rapid transitions between automatic reading operation and user interaction with the user interface means without requiring radical changes in the manually held disposition of the data terminal.

40. In a data capture system according to claim 39, said user interface means being in a longitudinally extended layer at an upper side of the juncture plane in normal user



operating orientation of the user interface means, and the automatic full image reader unit being directed generally forwardly and away from the user in said normal user operating orientation so as to be essentially in a normal reading disposition.

41. In a data capture system according to claim 39 or 40, said user interface means comprising a manually actuatable selection unit extending from a proximal end proximate to the user during user interaction therewith, to a distal end relatively more remote from the user, said data terminal having a hand grip portion substantially underlying the distal end of the manually actuatable selector unit and supporting the manually actuatable selector unit during manual actuation thereof.

42. In a data capture system according to claim 41, said hand grip portion having a rounded grip-conforming configuration so as to be comfortably embraced by the user's hand.

43. In a data capture system according to claim 42, a modular housing containing said automatically operating data transducing means and providing a downwardly protruding shoulder at a forward side of the hand grip portion.

44. In a data capture system according to claim 38, 39 or 40, said automatically operating data transducing means comprising a wireless communication unit, said wireless communication unit being removable and replaceable without requiring tuning adjustments.

45. In a data capture system according to claim 44, said wireless communication unit having a digital interface with the remainder of the data terminal such that said wireless communication unit is removable and replaceable without requiring tuning adjustments.

46. In a data capture system according to claim 38, 39 or 40, said automatically operating data transducing means comprising an automatic full image reader unit and an automatic wireless communication unit, a common transducer housing containing said automatic full image reader unit and said automatic wireless communication unit, said common

transducer housing being readily detachable from the user interface means.

47. In a data capture system according to claim 46, said control means comprising decoder means also contained in said common transducer housing for decoding data signals received from the automatic full image reader unit and for supplying decoded data signals to said wireless communication unit for transfer to an external host.

48. In a data capture system according to claim 1, 19 or 38, said automatically operating data transducing means being capable of reading an area image and having comparable resolution in respective orthogonal directions over its area field of view, and providing marker beams for delineating the area of the field of view at different distances from the transducing means.

49. In a data capture system according to claim 48, the marker beams being pulsed to conserve battery power.

50. In a data capture system according to claim 49, a range finder controlling pulsing of the marker beams such that the marker beams are pulsed only when a label is within the operative range of the transducing means.

51. In a data capture system according to claim 50, the range finder when enabled providing a pulsed visible light beam for indicating the aiming direction of the transducing means.

52. In a data capture system according to claim 1, 19 or 38, said user interface means comprising digitizer and display means capable of digitizing and displaying a person's signature.

53. In a data capture system according to claim 52, said digitizer and display means providing a common working surface for receiving a stylus impression according to an input signature, and for displaying a stored signature.

54. In a data capture system according to claim 1, 19 or 38, said automatically operating data transducing means comprising a full image reader unit capable of optically reading a person's signature and storing a digitized version of such signature.

55. In a data capture system according to claim 54, said

data terminal being operative to store valid signature records and to evaluate the authenticity of a signature read by said reader unit.